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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Chang-Hee Lee

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EXAMINER

JACOB, OOMMEN

ART UNIT

PAPER NUMBER

2613

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/593,848	Applicant(s) LEE ET AL.	
	Examiner OOMMEN JACOB	Art Unit 2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 December 2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 5) ☒ Claim(s) 1-22 is/are pending in the application.
- 5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☒ Claim(s) 1, 11-17, 19, 20 and 22 is/are allowed.
- 7) ☒ Claim(s) 2-10, 18 and 21 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☒ The drawing(s) filed on 21 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to Claims 2-10, 18, 21 have been considered but are moot in view of new grounds of rejection.

Allowable Subject Matter

2. Claims 1, 11-17, 19, 20, 22 are allowed over prior art.

Claim Rejections – 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 6-10, 18, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tervonen [WO 03/05511] in view of Kani [US PUB NO: 2004/0264963].**

As per Claims 6, 18, 21

Tervonen teaches a wavelength division multiplexing passive optical network (WDM-PON) for performing bi-directional communication (*Tervonen Fig 5*), the WDM-PON comprising:

at least two remote distribution nodes including a first remote distribution node and a second remote distribution node between a central office and a plurality of optical network units

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(*Tervonen Fig 5 items 512 is first remote distribution node and items 511, 513 comprise the second remote distribution node*), each of the first remote distribution node and the second remote distribution node is located in a physically separate location (*Tervonen Page 11 lines 29-31*), wherein the first remote distribution node and the second remote distribution node are connected to each other sequentially (*Tervonen Fig 5*),

wherein the first remote distribution node has an optical interleaver configured to couple a first composite optical signal and a second composite optical signal to the central office, wherein the first composite signal travels in a first direction, and the second composite optical signal travels in a second direction opposite the first direction (*Tervonen Fig 5 item 512 is an interleaver that couples composite signals upstream and downstream to the central office*), and

wherein the first remote distribution node is configured to connect to the second remote distribution node coupled to at least two optical network units (*Tervonen Fig 5 shows ONUs connected to second remote distribution node*), wherein each of the first remote distribution node and the second remote distribution node are configured to separate at least one wavelength channel from the first composite optical signal distributed through that remote distribution node (*Tervonen Fig 5 shows items 512, 511, 513 separating at least one wavelength in downstream direction*), wherein the optical interleaver is configured to split the first composite optical signal in a first wavelength band into a first portion consisting of odd numbered wavelength channels and a second portion consisting of even numbered wavelength channels (*Tervonen Fig 5 discloses item 512 separates downstream composite signal into first portion consisting of odd numbered wavelengths λ_1, λ_3 and a second portion consisting of even numbered wavelengths λ_2, λ_4*).

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The only difference is that Tervonen does not expressly teach that upstream and downstream traffic are carried in a first optical cable. Tervonen uses two cables.

Kani teaches use of a single cable for upstream/downstream traffic from CO to remote node (*Kani Fig 1 discloses WDM on same fiber for upstream/downstream communication from CO*). At the time of invention it would have been obvious to a person of ordinary skill in the art to modify the apparatus in Tervonen by integrating coupling as in Kani. The modification would have been to provide a method for connecting CO to remote node with more channels for communication.

As per Claim 7

Tervonen in view of Kani teaches Claim 6 as discussed above.

Tervonen in view of Kani further teaches wherein the optical interleaver is also configured to create the second composite optical signal in a second wavelength band from a combination of a first portion of wavelength channels in a second wavelength band and a second portion of wavelength channels in a second wavelength band (*Tervonen Fig 5 discloses item 512 combining wavelengths in upstream direction*).

As per Claim 8

Tervonen in view of Kani teaches Claim 6 as discussed above.

Tervonen in view of Kani further teaches wherein the first direction is a downstream direction from the central office, and the second direction is upstream direction to the central office, and wherein the first remote distribution node includes an optical interleaver is configured to receive the first composite optical signal that travels in the downstream direction from the central office, configured to divide the first composite optical signal into odd wavelength channel

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signals and even wavelength channel signals in order to output the odd and even wavelength signals to corresponding multiplexer/demultiplexers, and configured to receive the odd and even wavelength channel signals from the corresponding multiplexer/demultiplexers in order to combine the odd wavelength channel signals with the even wavelength channel signals (*Tervonen Fig 5*).

As per Claim 9

Tervonen in view of Kani teaches Claim 6 as discussed above.

Tervonen in view of Kani further teaches wherein the second remote distribution node includes a first multiplexer/demultiplexer to receive the odd numbered wavelength channels from the first remote distribution node and to send the first portion of the wavelength channels in a second wavelength band to the first remote distribution node (*Tervonen Fig 5 item 511*).

As per Claim 10

Tervonen in view of Kani teaches Claim 9 as discussed above.

Tervonen in view of Kani further teaches wherein the second remote distribution node includes a second multiplexer/demultiplexer to receive the even numbered wavelength channels of the first wavelength band from the first remote distribution node and to send a portion of the second wavelength band to the first remote distribution node (*Tervonen Fig 5 item 513*).

4. Claims 2-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tervonen [WO 03/05511] in view of Kani [US PUB NO: 2004/0264963] and further in view of Liu [US PUB NO: 2001/0038479].

As per Claim 2

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Claim 2 has limitations similar to Claim 6 and is rejected over Tervonen in view of Kani for same reasons of obviousness, as discussed with respect to Claim 6. The only difference is that Claim 2 requires a series of band splitting filters in the first remote distribution node instead of an interleaver. Tervonen in view of Kani does not expressly teach this.

Liu teaches band splitting using a series of band splitting filters (*Liu Fig 1 discloses two stages of band splitting filters based. More stages can be added based on groups and channel assignment for groups*). At the time of invention it would have been obvious to a person of ordinary skill to modify Tervonen in view of Kani by integrating arrangement as in Liu. The modification would comprise simple substitution since both methods are directed to split/combine wavelengths.

As per Claim 3

Tervonen in view of Kani and Liu teaches Claim 2 as discussed above.

Tervonen in view of Kani and Liu further teaches wherein the series of band splitting filters are coupled together to create the second composite optical signal in a second wavelength band by combining a first portion of the wavelength channels in the second wavelength band and a second portion of the wavelength channels in the second wavelength band (*Liu Fig 7*), wherein the second composite optical signal travels in the opposite direction of the first composite optical signal and occupies a different wavelength band than the first composite optical signal (*Kani Fig 1 discloses use of different bands for upstream/downstream*).

As per Claim 4

Tervonen in view of Kani and Liu teaches Claim 2 as discussed above.

Tervonen in view of Kani and Liu further teaches wherein the second remote distribution node includes a first multiplexer/demultiplexer is configured to receive a first subset of the wavelength channels in the first composite optical signal from the first remote distribution node and to send a first portion of wavelength channels in the second composite optical signal to the first remote distribution node (*Tervonen Fig 5*), wherein the second composite optical signal occupies a different wavelength band than the first composite optical signal (*Kani Fig 1 discloses use of different bands for upstream/downstream*).

As per Claim 5

Tervonen in view of Kani and Liu teaches Claim 4 as discussed above.

Tervonen in view of Kani and Liu further teaches wherein the second remote distribution node includes a second multiplexer/demultiplexer is configured to receive a second subset of the wavelength channels in the first composite optical signal from the first remote distribution node and to send a second subset of wavelength channels from the second wavelength band to the first remote distribution node (*Tervonen Fig 5*).

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to OOMMEN JACOB whose telephone number is (571)270-5166. The examiner can normally be reached on Monday - Friday, 8:00 a.m. - 5:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, KENNETH VANDERPUYE can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/O. J./

Acting Examiner of Art Unit 2613

/Shi K. Li/

Primary Examiner, Art Unit 2613